Status of Aerogel detector for high pT upgrade at PHENIX

Budget from US-J project for next two years :

(1) 400 liters of Aerogel
(2) 600 photomultiplier tubes
(3) read-out electronics
(4) detector construction
(5) one additional TOF panel

Preliminary design

12x12x10 cm^3, 300 segmentations, 2 tubes each
2x2 m^2 (4 TOF panels) at r=4.5m in west arm

Laser test for Aerogel optical properties

determine $\lambda_{absorption}$, $\lambda_{scattering}$ for the different wave length and the index of Aerogel

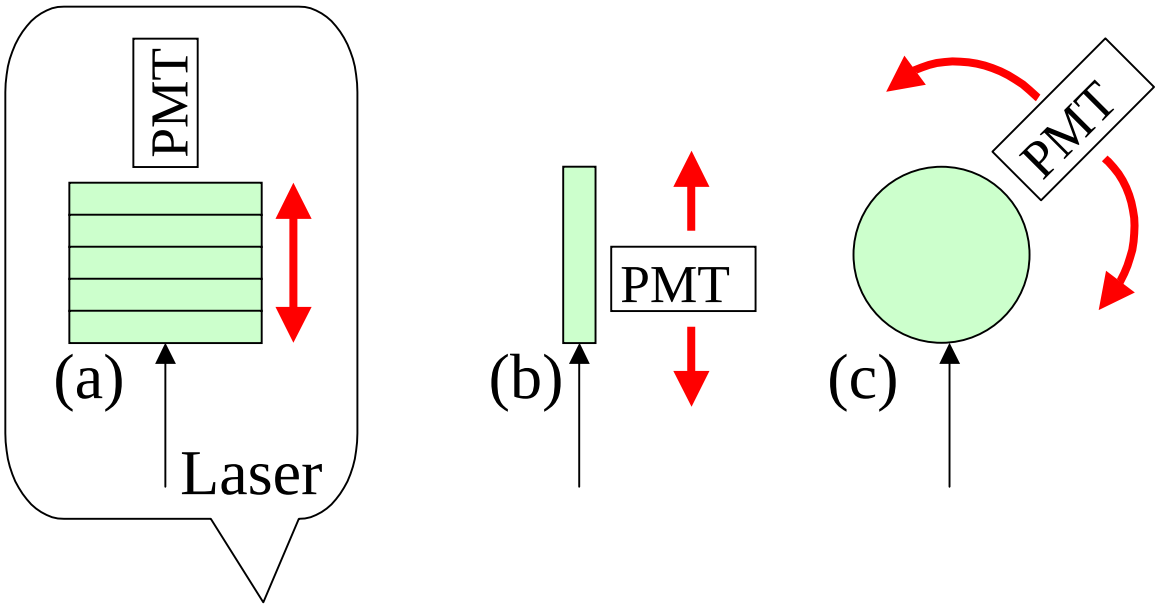
Beam test with several prototypes at KEK-PS

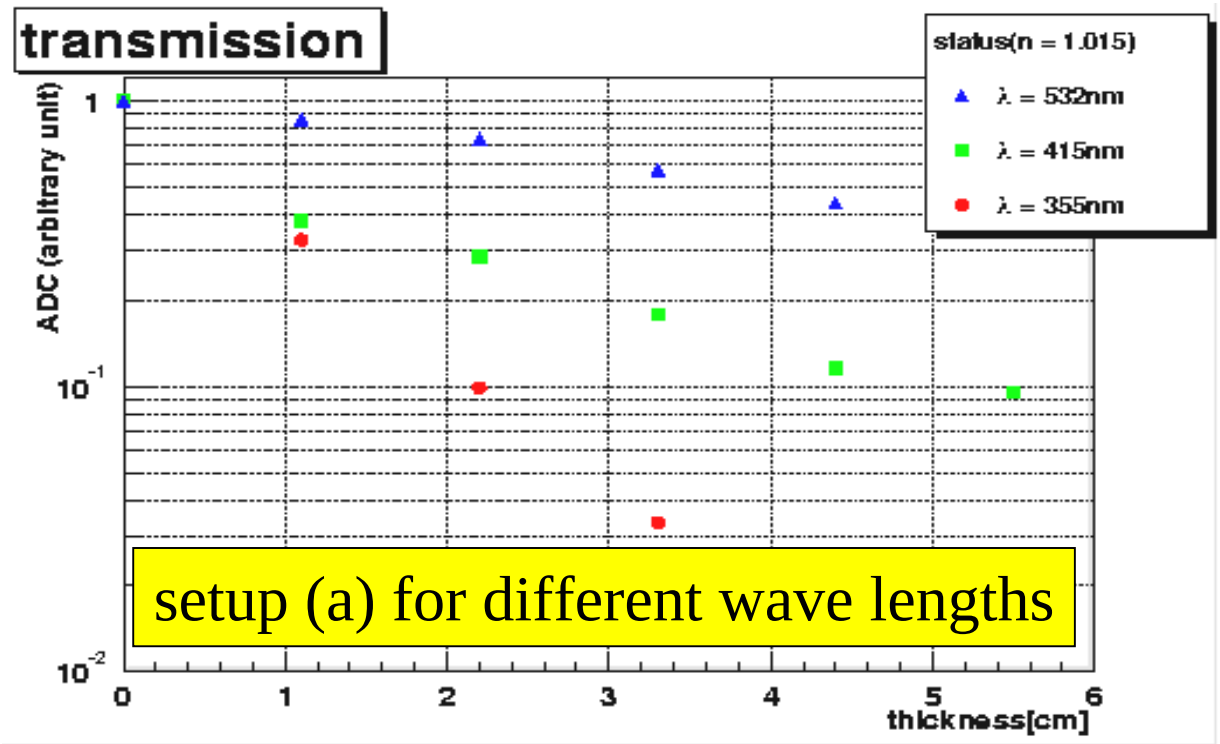
Belle type (2 PMTs directly on both sides of Aerogel)
Mirror type (mirror and PMT behind of Aerogel)
reflective material, thickness, position, angle and momentum dependence

Simulation study with pisa

5% occupancy with Hijing central Au+Au
(20% for all the charged tracks)

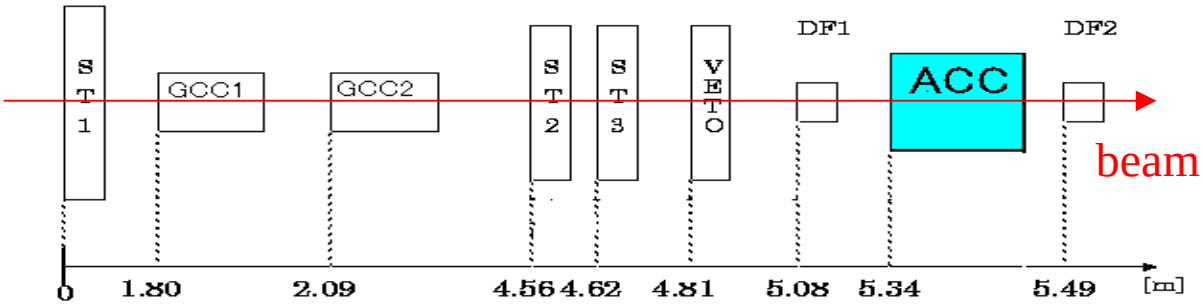
Laser test

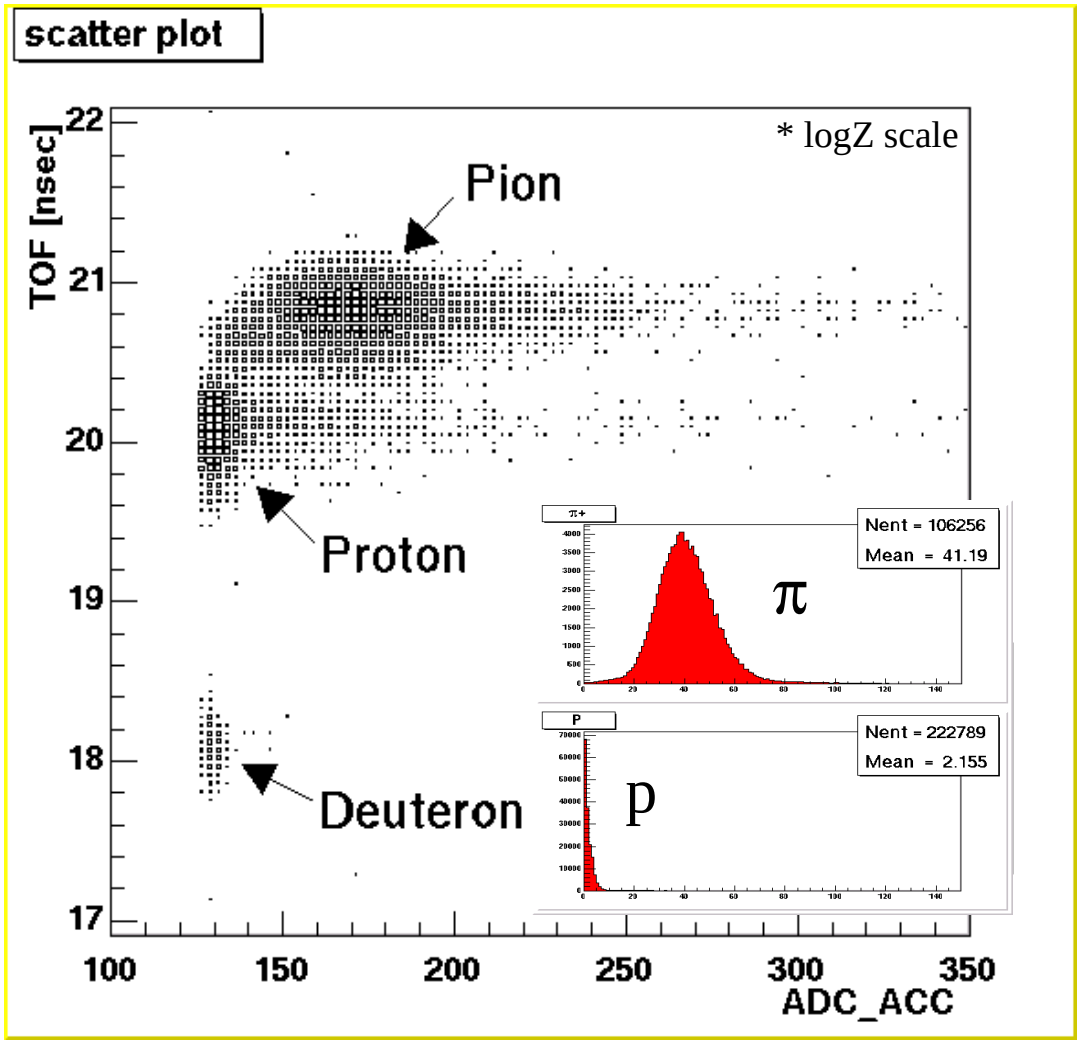


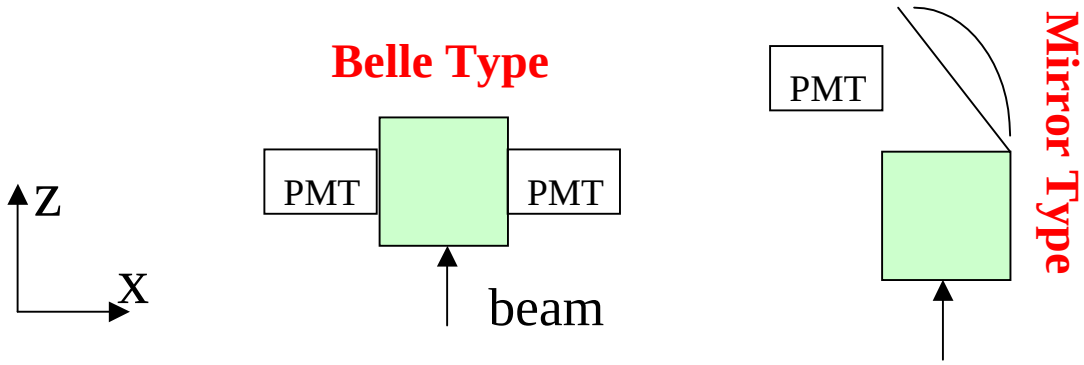


compare measurements and **optical monte-carlo** to determine $\lambda_{absorption}$, $\lambda_{scattering}$ with χ^2 minimization

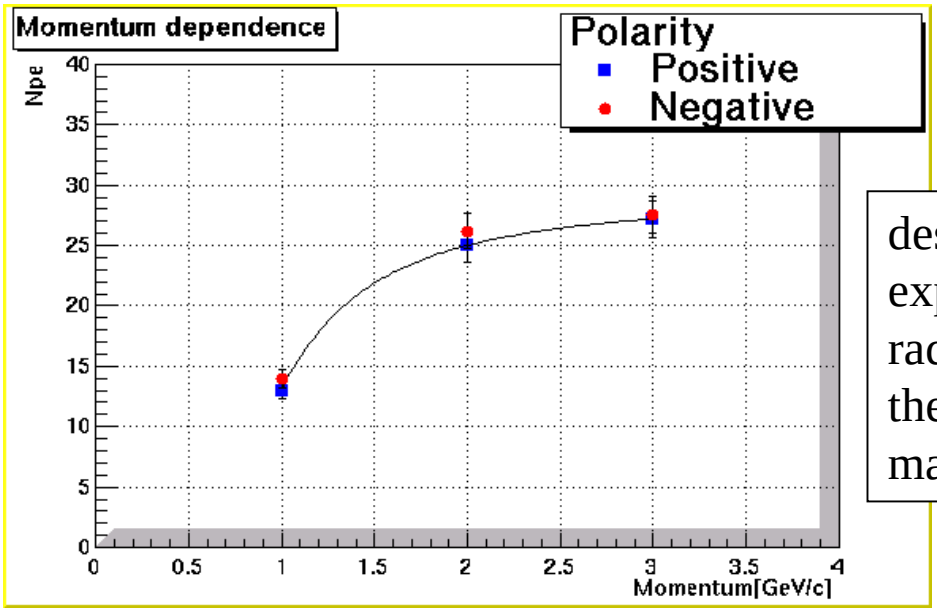
Beam test at KEK-PS, 2001/Dec



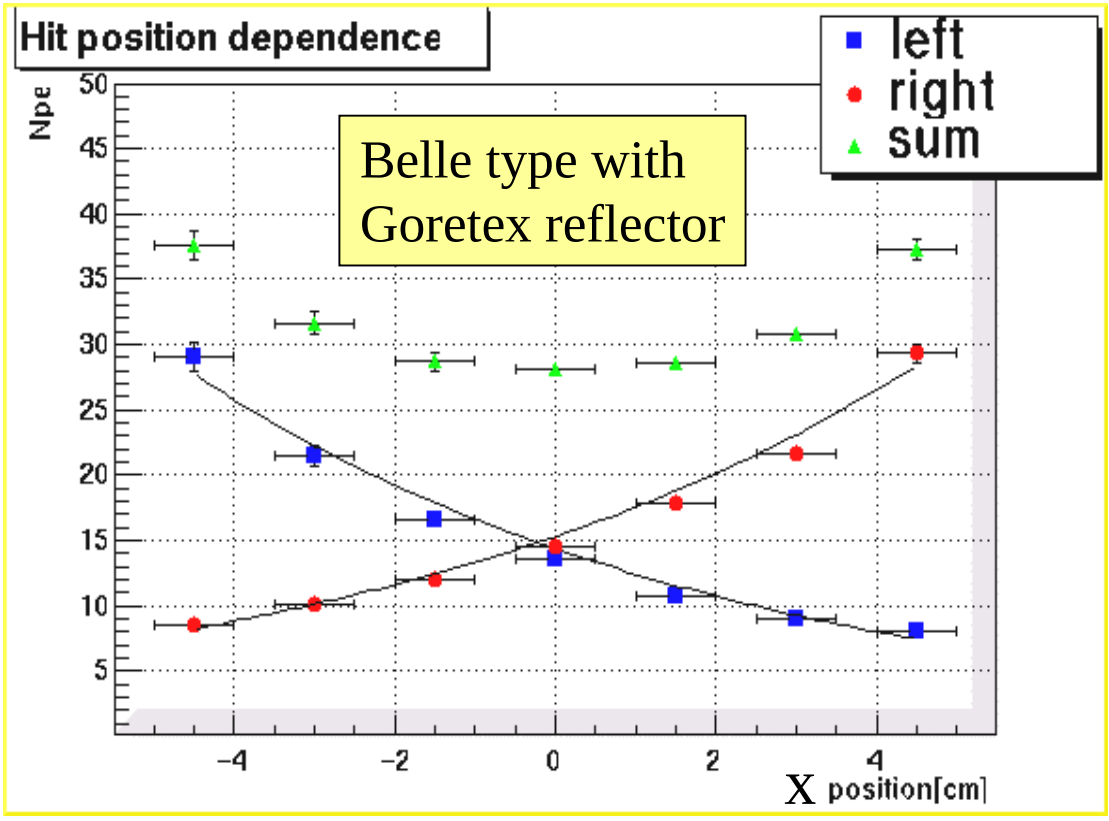


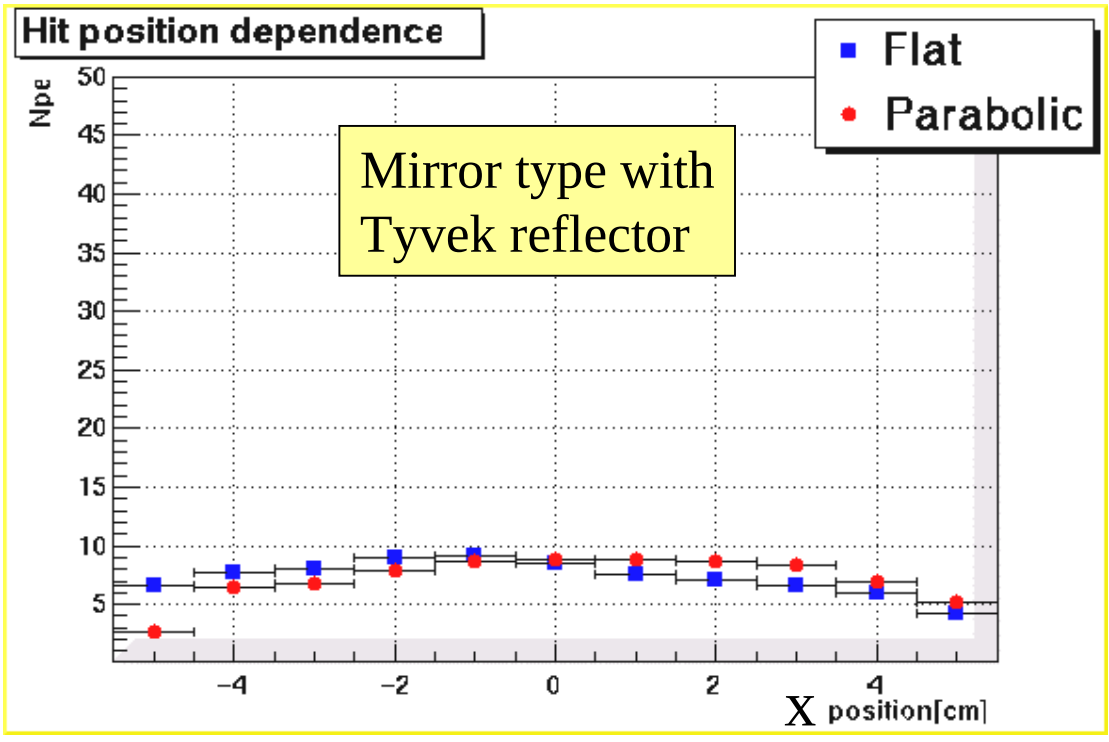


Type	Reflector	Index	Mom. (GeV)	$N_{photo\text{-}ele}$ (PMT1) (R6233.1500V)	$N_{photo\text{-}ele}$ (PMT2) (R6233.1500V)
Belle	Goretex	1.018	3	12	13
Belle	Millipore	1.018	3	9	10
Belle	Tyvek	1.018	3	8	8
Mirror (Flat)	Tyvek	1.018	3	9	—
Mirror (Parabolic)	Tyvek	1.018	3	9	—

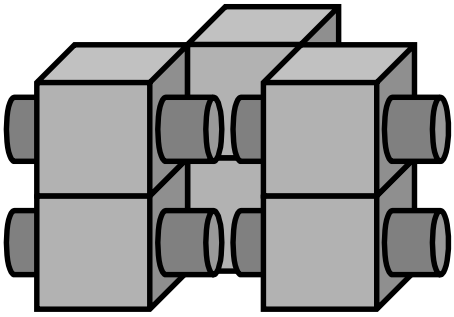


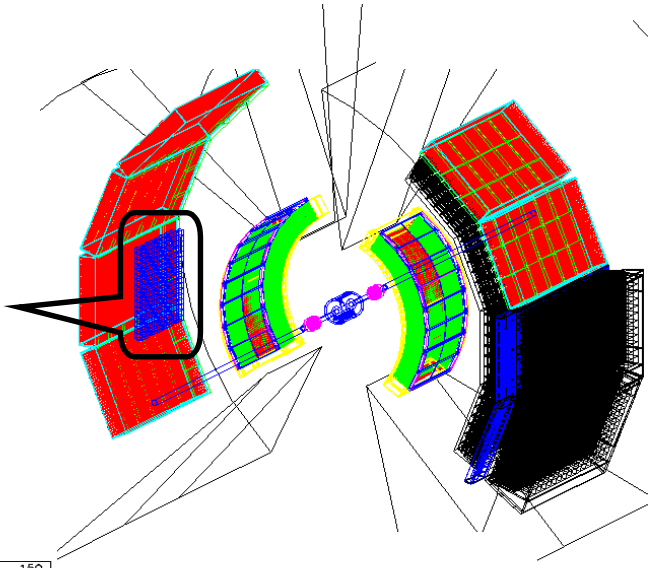
described by the expected Cherenkov radiation given by the index and pion mass

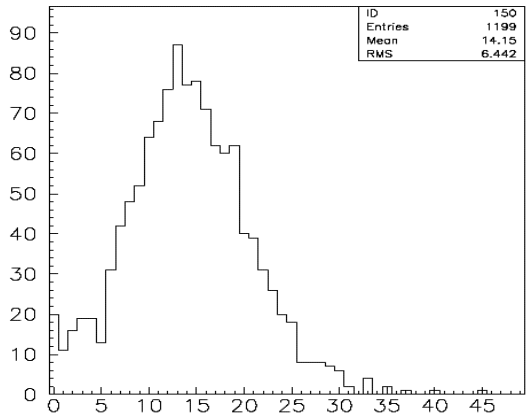

Hit position dependence
left
right
sum
Belle type with
Goretex reflector
Npe
X position[cm]


Hit position dependence
Flat
Parabolic
Mirror type with
Tyvek reflector
Npe
X position[cm]

PISA simulation with Aerogel

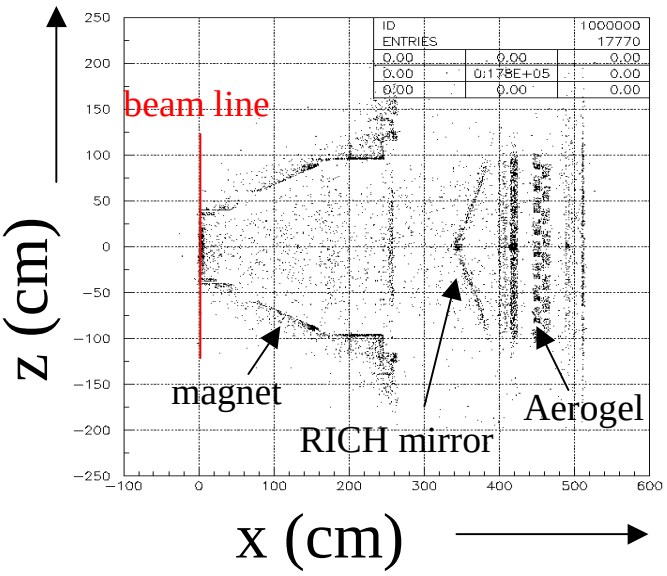




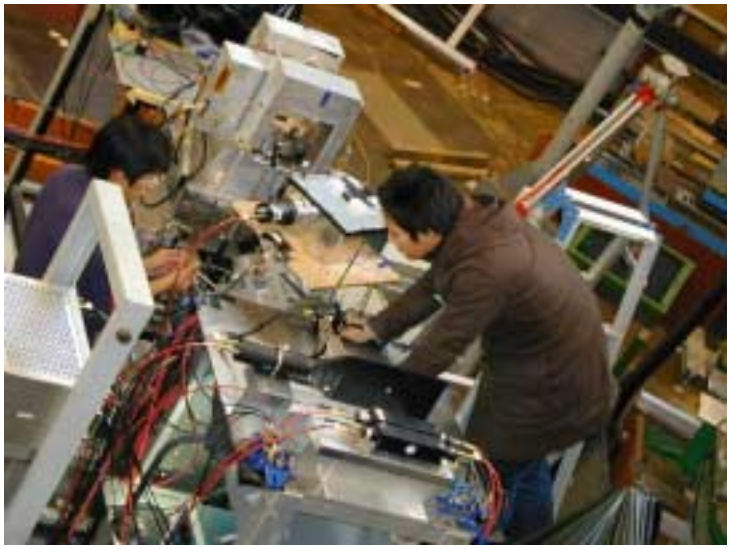


number of fired block / event

5% occupancy with
Hijing central Au+Au



background sources
for tracks which hit
any of Aerogel block,
many events overlaid



Aerogel counter prototype in the test beam line at KEK-PS

2001/Dec

Konno, Ohki

Aerogel in a Belle prototype

Aerogel counter simulation

Takagi

Summary of status

(1) definition of the project

*to enhance PID capability of PHENIX
upto 10GeV/c with Aerogel, TOF and RICH
*~400 liters of Aerogel with ~300 segmentation,
which is 4 TOF panels equivalent

(2) Detector R&D

*2001/Dec test experiment at KEK-PS
*Belle/mirror types are tested, the best result (>20pe)
is with Belle type with 3”PMT and Goetex reflector.
*Next test beam is planned before 2002/Summer.
*Detailed study for the absorption and scattering length
as a function of wave length with laser and spectrometer
is in progress.

(3) PISA simulation

*PISA simulation activity has been started at Tsukuba,
~300 Aerogel counters have been installed in west arm.
*Occupancy and background studies have been started.

(4) Budget and construction

*Purchase of Aerogel and PMTs with US-J budget will
be started in 2002 and finished in 2003.
*Dubna may be interested in the construction of detector,
Y.Miake will visit Dubna in March for further discussion.

(5) Issues and concerns

*2 TOF panels will be moved from east arm to west. 1 spare
panel exists at BNL. 1 panel will be newly build.
*Read-out electronics designed for RICH will be copied,
but it needs to be studied in detail.